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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/073,709      | 02/11/2002  | Feng Li              | 45106/242051        | 5428             |
| 826             | 7590        | 05/17/2005           |                     |                  |
| EXAMINER        |             |                      |                     |                  |
| TRAN, KHANH C   |             |                      |                     |                  |
| ART UNIT        |             | PAPER NUMBER         |                     |                  |
|                 |             | 2631                 |                     |                  |

DATE MAILED: 05/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                        |                     |
|------------------------------|------------------------|---------------------|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |
|                              | 10/073,709             | LI, FENG            |
|                              | Examiner<br>Khanh Tran | Art Unit<br>2631    |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) Responsive to communication(s) filed on 11 February 2002.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1,2,7 and 8 is/are rejected.
- 7) Claim(s) 3-6 and 9-11 is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:
  1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                    | Paper No(s)/Mail Date: _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date: _____ | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
|   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-2 and 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas et al. U.S. Patent 6,141,393 in view of Brunner et al. U.S. Patent 6,567,462 B1.

Regarding claim 1, Thomas et al. invention is directed to a method and device in a communication system including a receiver having a plurality of receiving antennas for receiving a plurality of information bursts transmitted by at least one transmitting user device.

In column 6 line 65 via column 7 line 20, referring to figure 2, a communication receiver 200 includes a plurality of antennas (101) wherein the outputs of the plurality of antennas are each provided to a receiving unit (201). Receiving units (201) correspond to the claimed radio frequency transceivers. The signals from the receiving units (201) are also fed into the Channel Estimation Device (208). In column 7 line 50 via column 8 line 25, the Channel Estimation Device (208) uses the outputs of the receiving units (201) during at least one of the training intervals (420) and the knowledge of the transmitted

sequence of pilot symbols to compute an estimate of the channel frequency response between the plurality of transmitting devices and the antennas (101) of the receiving device.

Figure 10 discloses a flow chart representation of steps of a method performed by the Combiner Controller in figure 2 for computing the combining weights in the antenna combiner in figure 3. In column 7, lines 1-25, the output of an Antenna Combiner is fed into an Information Decoding Unit (206), which decodes the Antenna Combiner Output (204) and generates data information (213) that was received by the Antennas (101). In view of that, the Antenna Combiner Output (204) corresponds to the claimed useful symbolic level signals.

Thomas et al. discloses the step of decoding the Antenna Combiner Output (204) and generates data information (213), but lacks the step of adding a scramble code and then obtaining a chip level reconstructed signal.

Nevertheless, Thomas et al. teachings apply to cellular communication system.

Brunner et al. invention discusses, in column 2, lines 25-65, a receiver for recovering data, for at least one of a plurality of users, from spread spectrum radio signals that include radio signals representative of a combination of data and data spreading code associated with the at least one of the plurality of users and a combination of a predetermined sequence of pilot data and a pilot spreading code. As well known in the art of code division multiple access, data is communicated by combining the data with user specific spreading code, and at the receiver, the data is recovered from the radio signals by comparing the

received sample radio signals with a user specific spreading code that is known to the receiver. In view of that, it would have been obvious for one of ordinary skill in the art at the time of invention, Thomas et al. demodulation step at the Information Decoding Unit (206) can be modified to include the step of despreading the received signal with a user specific spreading code.

In column 17, lines 10-35, Thomas et al. further teaches that with accurate estimates of the channel transfer functions, the channel transfer functions allow the estimates of the known transmitted signals to be subtracted from the received data at each antenna output in order to estimate the external interference plus noise. In view of that, estimates of the known transmitted signals correspond to the claimed the reconstructing signals and the received data corresponds to the claimed sampled-data output signals.

In column 6, lines 55-65, Thomas et al. teachings apply to the case of multiple User devices 120 and 130 or Base Stations 110 transmitting simultaneously to the receiving device as shown in figure 2. In light of the foregoing teachings, the receiver as taught by Thomas et al. processes all user signals the same way as discussed above.

Regarding claim 2, in column 8, lines 1-25, referring to figure 5, the Channel Estimation Device includes a Received Training Memory unit (510), which stores the output signals from the Receiving Units (201) that were collected during at least one of the data intervals (430). A microprocessor (540) collects the pilot sequence information

from the pilot sequence input (550) and computes a Matrix of Filtering Coefficients to be stored in a Filtering Matrix Memory Unit (520). The received data stored in a Received Training Memory unit (510) and the Matrix of Filtering Coefficients stored in the Filtering Matrix Memory Unit (520) are fed into Matrix Multiplier (530) where they are multiplied. In view of that, the user channel responses are stored as a matrix as claimed.

Regarding claim 7, referring figure 2, as recited in claim 1, in column 6, lines 55-65, Thomas et al. teachings apply to the case of multiple User devices 120 and 130 or Base Stations 110 transmitting simultaneously to the receiving device as shown in figure 2. The receiver recovers the information transmitted simultaneously by the User Devices 120 or 130 or Base Station 110. The plurality of Information Decoding Units 206 corresponds to the claimed signal reconstruction module. The plurality of antennas as shown in figure 2 detects a different version of multipath radio signals. Multipath components are part of the recovery of all user signals.

Regarding claim 8, referring to figure 3, complex weights 304 constitute the claimed interference cancellation module.

***Allowable Subject Matter***

2. Claims 3-6 and 9-11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Liang et al. U.S. Patent 6,314,147 B1 discloses "Two-Stage CCI/ISI Reduction With Space-Time Processing In TDMA Cellular Networks".

Kuwahara et al. U.S. Patent 6,597,678 B1 discloses "Radio Communication System Using Adaptive Array Antenna".

Paulraj et al. U.S. Patent 6,351,499 B1 discloses "Method And Wireless Systems Using Multiple Antennas And Adaptive Control For Maximizing A Communication Parameter".

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh Tran whose telephone number is 571-272-3007. The examiner can normally be reached on Monday - Friday from 08:00 AM - 05:00 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KCT

Xuan Cong Tran

05/13/2005

Examiner KHANTH TRAN